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WHITE FIR MARKING GUIDELINES FOR NORTHEAST CALIFORNIA

BACKGROUND: Northeastern California generally lies to the east of the southern Cascade mountains. There are recognized differences between Sierra Nevada and Cascade vegetation types (p. 21, Griffin, 1967). Woody species which characterize the eastside include big sagebrush, Artemisia tridentata, antelope bitterbrush, Purshia tridentata, mountain-mahogany, Cercocarpus spp., "rabbitbrush", Haplopappus bloomeri, and western juniper, Juniperus occidentalis (p. 17 & 18, Griffin, 1967). Occurrence of these, as well as other species of plants can be used to calculate a Vegetation Drought Index which will rank areas along a gradient of soil moisture availability (p. 21, Griffin, 1967). Sites to the east of the southern Cascades on soil derived from volcanic parent materials tend to be inherently "droughty". Griffin (p. 21) notes that "only in the drier habitats during drier seasons does the average soil moisture tension exceed 15 atmospheres". Fifteen atmospheres approximates the permanent wilting point of non-woody plants (p. 4, Fowells, 1965).

Table 1 gives the normal, 1990, and 1991 precipitation totals for selected reporting stations in northeastern California. The area east of the southern Cascades typically receives 15 to 20 inches of precipitation per year. The higher normal annual precipitation total indicates the recording station at Manzanita Lake, Lassen Volcanic National Park, is approximately the southern limit of the area of concern. Similarly, a higher annual total places the McCloud Ranger Station at the western edge of the area of concern.

TABLE 1 *

Location	Normal Precipitation (inches)	1990 Precipitation (inches)	1991 Precipitation (inches)
Adin RS	16.06	13.68	13.94
Alturas RS	12.45	8.73	12.04
Cedarville	14.39	9.11	12.63
Hat Cr. PH 1	18.39	11.87	16.19
Manzanita Lake	41.28	29.62	34.90
McCloud	51.26	30.23	26.79

* Data extracted from (U.S. Dept. of Commerce. NOAA. 1990 & 1991)

The drought has continued into 1992 (p. 1, California Dept. of Water Resources, 1992). Snow water equivalent in the Sacramento Basin snowpack on May 1, 1992 was 30 percent of the average for this date (p. 8, Calif. D.W.R., 1992). Snow water equivalent in the North Lahontan area on May 1, 1992 was 20 percent of average for this date (p. 10, Calif. DWR, 1992).

The minimum average annual precipitation which will support forested ecosystems is about 15 inches (p. 4, Fowells, 1965). Ponderosa pine will grow in areas

with as little as 10 inches of annual precipitation, as long as some rainfall is received during the growing season (p. 417, Fowells, 1965). The lower limit of precipitation for white fir is about 20 inches per year (p. 42, Fowells, 1965). Availability of soil moisture is more limiting to white fir than ponderosa pine due to its relative lack of stomatal control and its greater sensitivity to changes in vapor pressure deficit (p. 556, Barker, 1973). Some areas east of the southern Cascades do not receive enough precipitation during drought years to support white fir growth (Table 1.).

White fir mortality caused by the fir engraver, Scolytus ventralis, increases during drought periods (p.564, Berryman & Ferrell, 1988; p. 10, Ferrell & Hall, 1975; p. 1 & 2, Ferrell, 1986; p. 409, Furniss & Carolin, 1977). Berryman and Ferrell, 1988 (p. 654) also note that the amount of fir mortality caused by the fir engraver in a particular region has been associated with dry sites. A dramatic increase in true fir mortality on the eastside has been observed during 1992. True fir mortality visible during an aerial survey flight was moderate to heavy over a large area in Lassen County, and moderate in the general vicinity of Big Valley Mountain in Modoc County (CDF&FP memo, 1992). White fir mortality was severe in both the Sandy, and Hambone Timber Sales on the McCloud RD, Shasta-Trinity NFs, during the spring of 1992. Both sales met the criteria for Catastrophic Damage, as defined in standard Timber Contract clause B2.133 (USDA-FS, 3420 memos N92-1 & N92-2, 1992). White fir mortality on the Lassen NF was severe enough to warrent a press release (USDA-FS, Press release LAS-92-012, 1992). The amount of mortality in northeastern California is large enough to be considered "news-worthy" by local newspapers (A/C Valley Post, Newspaper articles dated: June 23, 1992 & June 30, 1992).

Drought stress has been so severe during the spring of 1992 that many white fir killed by the fir engraver on the eastside have shown few of the "normal" symptoms of infestation (USDA-FS, 3420 memos N92-1 & N92-2, 1992). A sample of trees displaying a range of symptoms were felled to develop guidelines to identify dead white fir in the Hambone and Sandy Timber Sales (personal communication, Bill McBain, Timber Operations Officer, and Len Park, Sale Administrator, McCloud RD, Shasta-Trinity NFs). These guidelines have been tested during the administration of both sales by observing felled trees judged to be dead under the guidelines, as well as felled trees considered to be "green". The consensus of the personnel involved is that over 70 percent of the white fir judged to be dead under these guidelines was so thoroughly infested with fir engraver and/or desiccated that the trees were absolutely dead (relatively low rate of error of commission). These guidelines are apparently conservative because a number of white fir trees judged to be "green" in these sales have been found to have a totally desiccated, or beetle-infested, top (unknown, but possibly high rate of error of omision).

GUIDELINES

Location: McCloud RD, Shasta-Trinity NFs; Big Valley RD, Modoc NF; Hat Creek and Eagle Lake RDs only.

Species: White fir only.

Inclusive dates: July 1, 1992 through December 31, 1992. To be reviewed and cancelled, extended or modified in January, 1993.

A. Mark white fir which have current, active fading from top down past diameter of 4 inches.

Justification: Scolytus ventralis is usually in the main stem in areas that are greater than 4 inches diameter (p. 3, Ferrell, 1986). Fading in tops which are too small for Scolytus ventalis, i.e., less than 4 inches diameter, are a result of attacks by Scolytus praeceps (p. 409, Furniss & Carolin, 1977) and will not necessarily result in the rest of the bole becoming infested with Scolytus ventralis.

B. Mark white fir with branch "flagging" (yellowed or red branches in an otherwise green tree) if EITHER 1 OR 2 listed below are also present:

Justification: Initial Scolytus ventalis attacks in the crown may girdle branches. Flagging is the first easily seen sign of infestation (p. 2, Ferrell, 1986).

1. Reddish-brown or white boring dust along trunk in bark crevices and in cobwebs. (p.557, Berryman & Ferrell, 1988; p. 3, Ferrell, 1986).

OR

2. Galleries of Scolytus ventalis with associated stain from the fungus Trichosporium symbioticum are present in the cambial region. **(Minimum of 4 square inches of bark must be removed).**

Justification: The characteristic egg gallery can be used to identify the fir engraver (p. 559, Berryman & Ferrell, 1988; p. 3 & 4, Ferrell, 1986; p. 410, Furniss & Carolin, 1977). The brown-staining fungus, Trichosporium symbioticum, is invariably associated with galleries of the fir engraver (p. 559, Berryman & Ferrell, 1988). The brown-staining fungus is apparently essential for successful brood development (p. 409, Furniss & Carolin, 1977).

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